WJEC CBAC

GCSE

4782/02

SCIENCE B
UNIT 2: Science and Life in the Modern World
HIGHER TIER

A.M. TUESDAY, 14 January 2014

1 hour

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	10	
2.	6	
3.	10	
4.	9	
5.	8	
6.	9	
7.	8	
Total	60	

ADDITIONAL MATERIALS

In addition to this paper you may require a calculator and a ruler.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

If you run out of space, use the continuation pages at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.
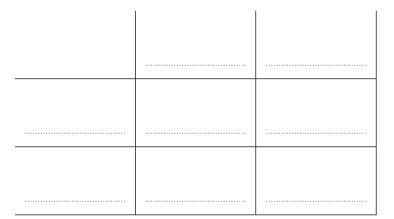
You are reminded that assessment will take into account the quality of written communication used in your answer to question **2** and **7**(b).

A periodic table is printed on page 16.

*Answer **all** questions.*

1. Cystic fibrosis is an inherited disease.

(a) Name the section of DNA that causes cystic fibrosis. [1]

....

(b) The family trees below show how cystic fibrosis has been inherited.

Lucy's family tree   **David and John's family tree**

Grandparents

Parents

Children

Lucy   David   John

Key

◯ non-suffering female   ▢ non-suffering male

⬮ female suffering from cystic fibrosis   ◼ male suffering from cystic fibrosis

Use the letters:
N = normal allele
n = cystic fibrosis allele

(i) Use the information above to state the genotype of: [2]

John   ....

David   ....

(ii) Lucy is heterozygous. Write down Lucy's genotype. [1]

....

(c) (i) Complete the Punnett square below and use it to calculate the chance of **Lucy** and **David** having a child with cystic fibrosis. [3]

	....	....
....	....	....
....	....	....

Chance = ... %

(ii) Construct a Punnett square and use it to calculate the chance of **Lucy** and **John** having a child with cystic fibrosis. [3]

Chance = ... %

10

2. A student was given three different types of antacid tablets.

Design an experiment he would need to carry out to determine the most effective tablet in treating acid indigestion.

- Identify the key steps in the investigation.
- Describe how the results could be used to reach a conclusion.

(6 QWC)

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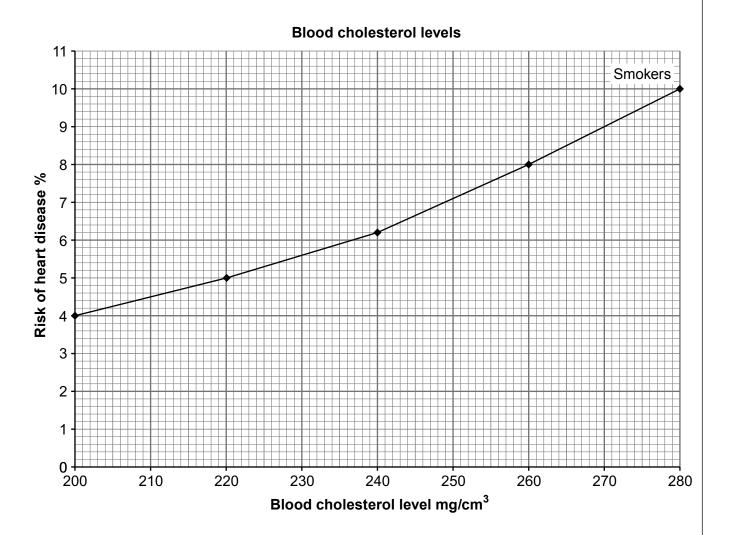
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3. A diet rich in animal fats can cause a build-up of cholesterol in the blood. The table below shows the results of a recent study, linking blood cholesterol levels and the risk of developing heart disease.

Blood cholesterol /mg per cm^3	200	220	240	260	280
Non-smokers Risk of developing heart disease %	2.4	3.6	4.5	5.5	6.6

(a) (i) Plot information from the table on the graph paper below. Label your plot **non-smokers**. [3]

Blood cholesterol levels

(ii) Use the information to calculate the difference in risk of developing heart disease for smokers and non-smokers at a cholesterol level of 240 mg/cm^3. [2]

....

....

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(b) State **two** conclusions that can be made from this study. [2]

1. ....

2. ....

(c) State **two** controls the researchers should use to make this a fair test. [2]

1. ....

2. ....

(d) Suggest **one** way in which this study could be changed to improve the validity of the
results. [1]

....

....

10

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4. *(a)* Complete the following table. [2]

Monomer name	tetrafluoroethene	ethene	vinyl chloride
Polymer	PTFE	Polyethene	PVC
Formula	....	C_2H_4	C_2H_3Cl
Structural Formula	F\C=C/F F/ \F	H\C=C/H H/ \H	....

(b) Complete the symbol equation for the polymerisation of ethene. [2]

n [H\ /H C=C H/ \H] ⟶ ....

(c) Use the diagram below to explain why melamine does not soften on heating. [3]

long chain

crosslink

....

....

....

....

(d) PTFE has been used to develop new artificial veins to transport blood around the body in patients with cardiovascular disease.
State **two** properties of PTFE that makes it suitable for this use. [2]

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9

5. Sulfuric acid reacts with zinc carbonate ($ZnCO_3$) to form a useful salt.

(i) Write a **balanced** chemical equation for this reaction. [3]

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(ii) Name the salt that would be formed by reacting hydrochloric acid with potassium hydroxide solution. [1]

....

(iii) Name the acid and alkali needed to produce potassium nitrate. [2]

acid ....

alkali ....

(iv) State **one** industrial use for the following salts: [2]

1. zinc sulfate ....

2. potassium nitrate ....
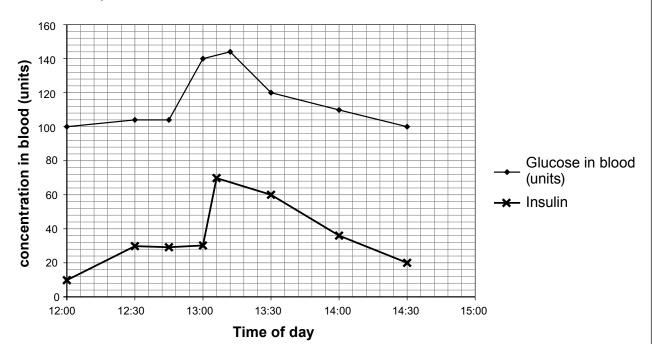
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6. Radioactive iodine-131 is routinely used as internal radiotherapy in the treatment of thyroid cancers.

(a) (i) Describe what is meant by the term *internal radiotherapy*. [2]

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(ii) Iodine-131 has a **half-life** of 8 days. Explain what this means. [2]

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(iii) Calculate the **fraction** of the original amount of iodine-131 that would be left in the body after 32 days. [2]

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(b) Explain why there may be a health risk for medical technicians who administer iodine-131. [3]

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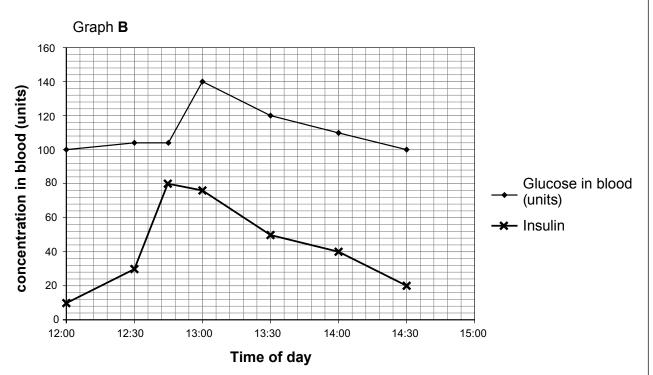
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7. *(a)* Diabetes is a common disease in which a person can have high blood sugar (glucose) level. Distinguish between **type 1** and **type 2** diabetes. [2]

....

....

....

(b) The graphs show the blood sugar levels from two different people. One is suffering from type 1 diabetes; the other is a non-sufferer.

Graph **A**

Graph **B**

Account for the differences between the two graphs obtained in this study. [6 QWC]

- Describe what the information in graph **A** shows.
- Describe what the information in graph **B** shows.
- Explain how you can deduce from the graphs which is the sufferer.

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END OF PAPER

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For continuation only.

Periodic Table of the Elements

Key:

element name
atomic number
symbol

1	2												3	4	5	6	7	0
						hydrogen 1 **H**												helium 2 **He**
lithium 3 **Li**	beryllium 4 **Be**												boron 5 **B**	carbon 6 **C**	nitrogen 7 **N**	oxygen 8 **O**	fluorine 9 **F**	neon 10 **Ne**
sodium 11 **Na**	magnesium 12 **Mg**												aluminium 13 **Al**	silicon 14 **Si**	phosphorus 15 **P**	sulfur 16 **S**	chlorine 17 **Cl**	argon 18 **Ar**
potassium 19 **K**	calcium 20 **Ca**	scandium 21 **Sc**	titanium 22 **Ti**	vanadium 23 **V**	chromium 24 **Cr**	manganese 25 **Mn**	iron 26 **Fe**	cobalt 27 **Co**	nickel 28 **Ni**	copper 29 **Cu**	zinc 30 **Zn**		gallium 31 **Ga**	germanium 32 **Ge**	arsenic 33 **As**	selenium 34 **Se**	bromine 35 **Br**	krypton 36 **Kr**
rubidium 37 **Rb**	strontium 38 **Sr**	yttrium 39 **Y**	zirconium 40 **Zr**	niobium 41 **Nb**	molybdenum 42 **Mo**	technetium 43 **Tc**	ruthenium 44 **Ru**	rhodium 45 **Rh**	palladium 46 **Pd**	silver 47 **Ag**	Cadmium 48 **Cd**		Indium 49 **In**	tin 50 **Sn**	antimony 51 **Sb**	tellurium 52 **Te**	iodine 53 **I**	xenon 54 **Xe**
caesium 55 **Cs**	barium 56 **Ba**	lutetium 71 **Lu**	hafnium 72 **Hf**	tantalum 73 **Ta**	tungsten 74 **W**	rhenium 75 **Re**	osmium 76 **Os**	iridium 77 **Ir**	platinum 78 **Pt**	gold 79 **Au**	mercury 80 **Hg**		thallium 81 **Tl**	lead 82 **Pb**	bismuth 83 **Bi**	polonium 84 **Po**	astatine 85 **At**	radon 86 **Rn**
francium 87 **Fr**	radium 88 **Ra**																	

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